INVENTOR: CHIEN-WEI LI DOCKET: H0003762

ATTY: ROBERT DESMOND; PHONE: (602) 365-2588

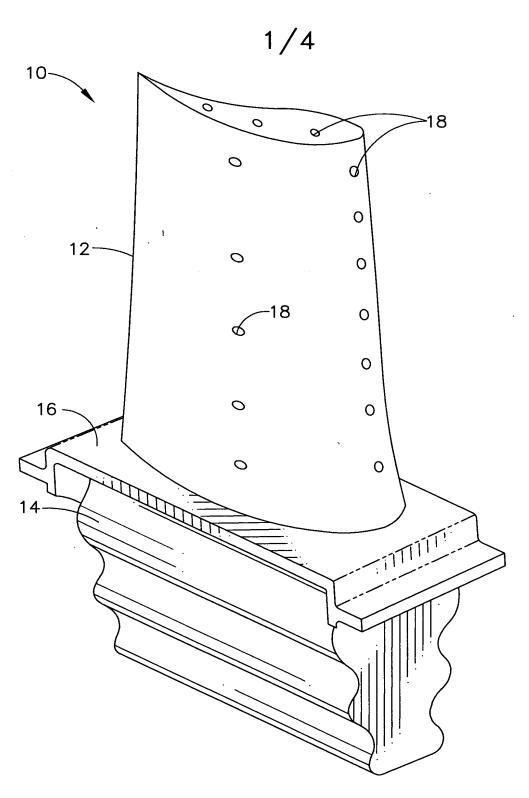


FIG. 1

ATOMIC LAYER DEPOSITION FOR TURBINE COMPONENTS

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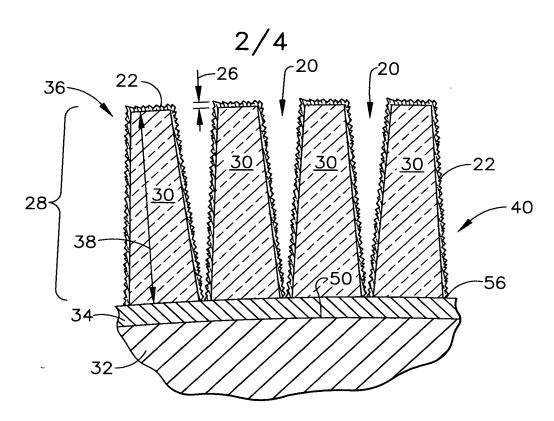


FIG. 2

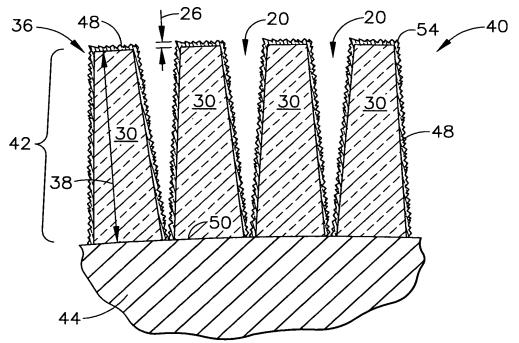


FIG. 3

ATOMIC LAYER DEPOSITION FOR TURBINE COMPONENTS
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3/4

200 -

DEPOSIT A TANTALUM OXIDE (Ta_2O_5) LAYER ONTO A SILICON-BASED SUBSTRATE (ONE OF A SILICON NITRIDE SUBSTRATE AND A SILICON CARBIDE SUBSTRATE), BY ELECTRON BEAM PHYSICAL VAPOR DEPOSITION, SUCH THAT THE TANTALUM OXIDE (Ta_2O_5) LAYER IS IN THE FORM OF COLUMNAR GRAINS.

210 -

DEPOSIT AN INORGANIC LAYER (SELECTED FROM THE GROUP CONSISTING OF ALUMINUM OXIDE (AI₂O₃), TANTALUM CARBIDE (T_aC), HAFNIUM OXIDE (HfO₂), MIXTURES THEREOF, NANO—LAMINATES THEREOF, AND ALLOYS THEREOF, OR SELECTED FROM THE GROUP CONSISTING OF SILICON CARBIDE (SiC), SILICON NITRIDE (Si₃N₄), OXYCARBIDES, CARBONITRIDES, MIXTURES THEREOF, NANO—LAMINATES THEREOF, AND ALLOYS THEREOF), BY ATOMIC LAYER DEPOSITION, ONTO THE TANTALUM OXIDE (Ta₂O₅) LAYER, SUCH THAT THE INORGANIC LAYER IS UNIFORM AND CONFORMAL.

220 -

FIG. 4

DEPOSIT AN YTTRIA-STABILIZED ZIRCONIA LAYER ONTO A NICKEL SUPERALLOY TURBINE COMPONENT (SELECTED FROM THE GROUP CONSISTING OF A TURBINE BLADE, A TURBINE VANE, A COMBUSTOR FUEL NOZZLE, AND A COMBUSTOR SHIELD), BY ELECTRON BEAM PLASMA VAPOR DEPOSITION, SUCH THAT THE YATTRIA-STABILIZED ZIRCONIA LAYER IS IN THE FORM OF COLUMNAR GRAINS.

230 —

DEPOSIT AN INORGANIC LAYER (SELECTED FROM THE GROUP CONSISTING OF ALUMINUM OXIDE (Al_2O_3) , TANTALUM CARBIDE (TaC), TANTALUM OXIDE (Ta_2O_5) HAFNIUM OXIDE (HfO_2) , MIXTURES THEREOF, NANO—LAMINATES THEREOF, AND ALLOYS THEREOF; OR SELECTED FROM THE GROUP CONSISTING OF SILICON CARBIDE (SiC), SILICON NITRIDE (Si_3N_4) , OXYCARBIDES, CARBONITRIDES, MIXTURES THEREOF, NANO—LAMINATES THEREOF, AND ALLOYS THEREOF), BY ATOMIC LAYER DEPOSITION, ONTO THE YTTRIA—STABILIZED ZIRCONIA LAYER, SUCH THAT THE INORGANIC LAYER IS UNIFORM AND CONFORMAL.

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4/4

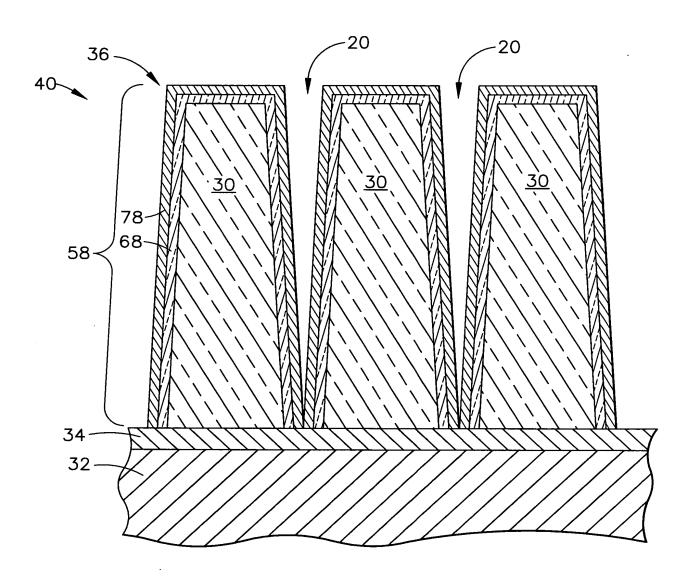


FIG. 6